U.S. Coast Guard Rescue 21 Technical Consulting

Outputs

- Written technical feedback on design and test documents.
- Radio Frequency (RF) analysis.
- Witnessing of field and factory tests on location.
- Meeting attendance as subject matter experts.

Rescue 21 is a project undertaken by the U.S. Coast Guard to modernize and upgrade its current communications capability. This system should enhance the Coast Guard's capabilities by increasing its response coverage area, by providing a common operation environment, and by providing Coast Guard personnel with modernized tools to perform their missions. Rescue 21 is the maritime emergency response (911) system for the coastal U.S. and the communications infrastructure for all Coast Guard coastal missions. Rescue 21 will consist of many operating regions along the U.S. coast and waterways. Each region will have a Group Communications Center (GCC) that is networked to a Search and Rescue Station and several Remote Transceiver Sites. Rescue 21 is a hybrid communications system composed of wireless and wired components.

ITS has an Interagency Agreement with the Coast Guard to provide technical expertise during the Developmental Testing and Evaluation (DT&E) phase of Rescue 21. DT&E includes two levels of testing — a Formal Qualification Test (FQT) at the contractor's facility, and a System Integration Test (SIT) in the field. ITS provided technical consulting to the Coast Guard for the entire DT&E phase. For both FQT and SIT, written analysis and recommendations were provided on the test approach, test plans, and test procedures. ITS also participated in the witnessing of both tests on site.

ITS's technical contributions were focused mainly in the following areas:

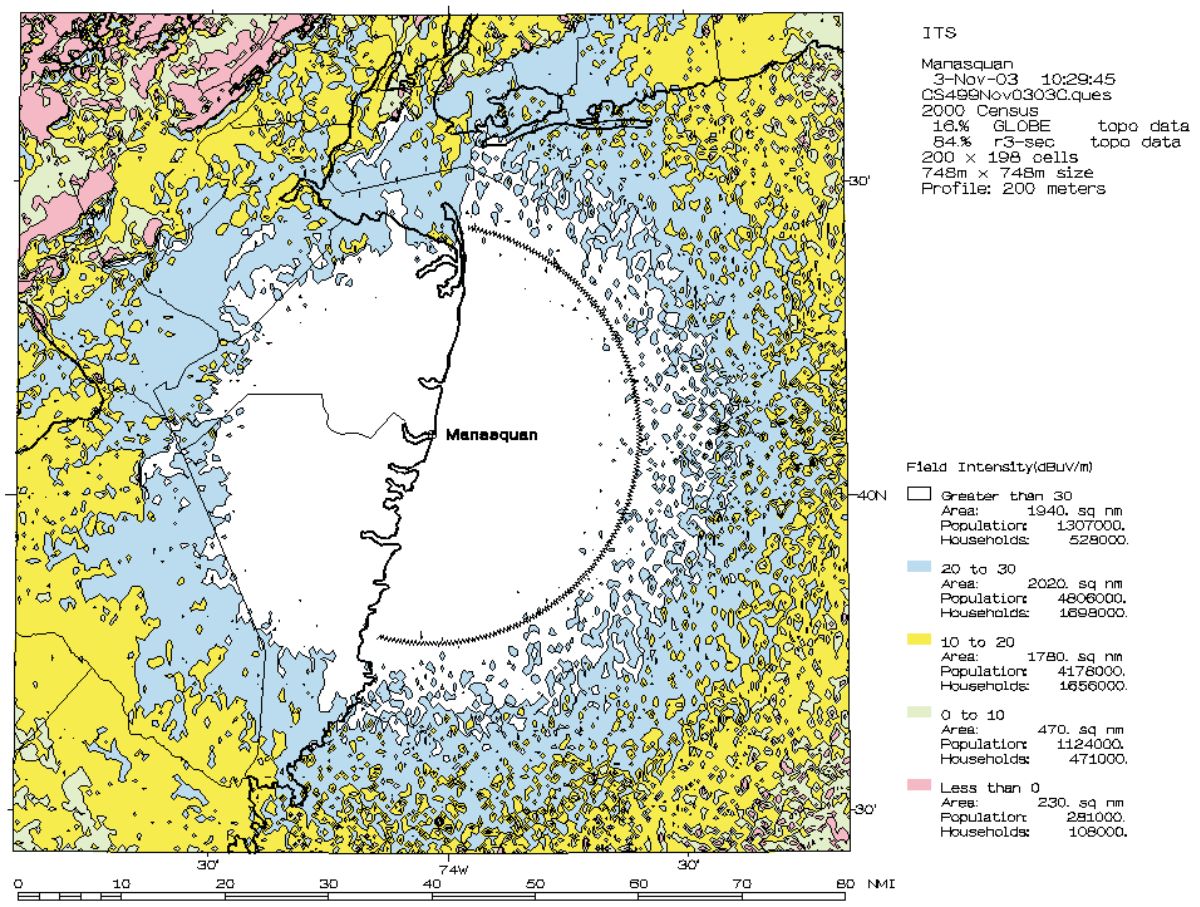
Performance Availability
All GCC's in the system are networked together with the rest of the Coast Guard communications functions, and must have the capacity to track Coast Guard assets and emergency calls as they are passed from region to region. ITS provided analysis of the effect of network traffic on system availability.

RF Coverage
The Rescue 21 system is required to provide RF coverage along the entire U.S. coastline, lakes, and intercoastal waterways, out to a 20 nautical mile boundary. ITS reviewed the SIT test plans to ensure that the test procedures would result in a reasonable proof of the coverage requirement. Measurement methods and sampling paths and locations were analyzed for compliance with TSB-88 and standard practice for communication coverage testing.

Propagation Modeling
In support of the RF coverage analysis, ITS provided the Coast Guard with antenna coverage predictions using the Irregular Terrain Model (ITM) and the Advanced Propagation Model (APM). These models were used to anticipate the effects of ocean wave heights on the coverage area (see the figure on the next page).

Voice Quality
ITS is a recognized expert in the area of Voice Quality analysis, and provided written recommendations to the Coast Guard for analyzing the voice quality received over Rescue 21 wireless channels against the specifications in the system requirements.

Direction Finding
The new system will be able to create a line of bearing in the direction of vessels in distress within one degree of accuracy. ITS used its experience with direction finding systems in the analysis of test plans and procedures.



Effect of 10m waves on propagation coverage area (area shown is the New Jersey shoreline).

P25 Specifications and Requirements
The Rescue 21 Performance Specification requires interoperability with other emergency response agencies through utilization of P25 equipment. ITS applied its expertise in this area to the review of test documents for parts of the system which use P25.

RF Interference
One key factor in RF coverage is the consideration of the RF noise environment. ITS analyzed test plans and procedures to ensure proper measurement of the RF environment and the expected effects on RF coverage. In addition, one of the upgrades Rescue 21 provides to the Coast Guard over its current communications system is the capability for simultaneously communicating over multiple channels. ITS provided technical input in the area of intermodulation interference during simultaneous communications.

As Rescue 21 nears the end of DT&E, ITS continues to provide technical feedback and analysis on the test data and results, helping the Coast Guard verify whether or not the system specifications and technical requirements have been met.

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